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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CHIA MU SHAO

Appeal 2009-002509
Application 09/973,285
Technology Center 3700

Decided: [1]June 25, 2009

Before ERIC GRIMES, RICHARD M. LEBOVITZ, and
FRANCISCO C. PRATS, *Administrative Patent Judges*.

LEBOVITZ, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] The two-month time period for filing an appeal or commencing a civil action, as provided for in 37 C.F.R. § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

This is a decision on appeal from the Patent Examiner's rejections of claims 1-6, 8-11, 14, and 15 as obvious over prior art. Jurisdiction for this appeal is under 35 U.S.C. § 6(b). We reverse the rejections.

Statement of the Case

The claimed invention is an electronic dart game based on the principle of electromagnetic induction (Spec. 1:4-5). The dartboard contains inductance coils associated with each scoring sector (*id.* at 7: 9-20). Upon entry of a magnetic dart into a scoring sector, an electrical signal is produced in the inductance coil (*id.*). The coil is connected to a scoring means for registering the score associated with dart entry (*id.* at 6).

Claims 1-11, 14, and 15 are pending. The Examiner rejected the claims as follows:

Claims 1-6, 8-11, 14, and 15 under 35 U.S.C. § 103(a) as obvious in view of Fuscone (UK Application GB 2,086,243 A, 12 May 1982) or Fuscone and Gordon (U.S. Pat. No. 5,419,565, 30 May 1995) (Ans. 3 & 7); and

Claim 7 under 35 U.S.C. § 103(a) as obvious in view of Fuscone and Clark (U.S. Pat. No. 4,768,789, 6 Sep. 1988) or Fuscone, Gordon, and Clark (Ans. 6 & 10).

Claims 1 and 7 are representative and read as follows:

1. An electronic dart game comprising:
a dart;
a dartboard, provided with
a frame, formed of a plurality of scoring areas by a plurality of radial spiders and circumferential spider which are arranged crossly;
a main body receiving said dart, attached to said frame; and

an electronic scoring means for displaying signals collected from said scoring areas;
a plurality of coreless inductance coils with predetermined turns, provided with said frame and connected to said electronic scoring means through cables;
said dart is provided with a magnetic substance;
each of said coreless inductance coils is associated with a corresponding one of said scoring areas and defines a scoring signal zone; and
a scoring signal is generated by said dart entering said scoring signal zone, said signal is transmitted to said electronic scoring means.

7. An electronic dart game according to [claim 1 where the inductance coils are provided with predetermined shape to be engaged with said scoring areas and the cross-section of each turn of said coil matches and is smaller than that of said scoring areas], wherein a plurality of said coreless coils correspond to different scoring areas representing the same score, are wired together before being connected to said electronic scoring means.

OBVIOUSNESS OVER FUSCONE OR FUSCONE AND GORDON

Statement of the Issue

The Examiner contends that Fuscone describes all the elements of the electronic dart game of claim 1, but does not teach that the inductance coil is "coreless" as recited in the claim. Rather, the Examiner found that Fuscone's dartboard comprises an inductance coil with a core made of iron. However, the Examiner contends that it would have been obvious to persons of ordinary skill in the art to have replaced Fuscone's iron cored coil with a coreless coil based on the teachings of Fuscone, alone, or in combination with the Gordon patent.

Appellant contends that Fuscone, alone, or combined with Gordon, would not have led persons of ordinary skill in the art to have eliminated the iron core from Fuscone's coil.

The main issue in this rejection is therefore as follows: Did Appellant establish that the Examiner erred in concluding that it would have been obvious to persons of ordinary skill in the art to have utilized a coreless inductance coil in Fuscone's dartboard?

Principles of Law

"Only a reasonable expectation of success, not absolute predictability, is necessary for a conclusion of obviousness." *In re Longi*, 759 F.2d 887, 897 (Fed. Cir. 1985).

"Although predictability is a touchstone of obviousness, the 'predictable result' discussed in *KSR* refers not only to the expectation that prior art elements are capable of being physically combined, but also that the combination would have worked for its intended purpose. *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1739-40 (2007)." *Depuy Spine, Inc v. Medtronic Sofamor Danek, Inc.* (Fed. Cir. 2008-1240, -1253, -1401, Decided June 1, 2009).

Findings of Fact (FF)

The Fuscone application

1. Fuscone describes a "system for sensing and identifying the segment of an area upon which targeting shots with any kind of projectile are directed." (1:4-7). A "dartboard" is listed as a "primary example." (*Id.* at 1:21.)

2. According to Fuscone, a sensor assembly is attached to the rear surface of a dartboard (1:122 to 2:8). The assembly comprises sensor coils placed into section areas which correspond to the scoring sectors of a standard dartboard (*id.*).

3. Each sensor coil comprises an inductor core 3 made of iron around which is placed a coil 4 (1:127-128). The core is riveted to the rear of the dart board (*id.* at 1:125-128).

4. Figure 8, reproduced below, shows a portion of the rear sensor assembly.

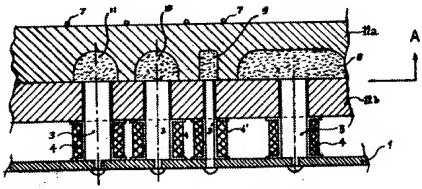

Figure 8 shows a sensor assembly affixed to the back of a dartboard.

5. When a magnetic dart impacts the dartboard, it produces a voltage change in the sensor coil (2:20-82).

6. A circuit attached to the sensor assembly identifies the location of the largest signal, allowing the dart to be electronically scored (2:35-82).

7. Fuscone states that to "increase the input difference signals", the "effect of the magnetic field of the projectile in the wanted sector can be increased by making this sector . . . magnetically conductive" (4:20-24).

8. To accomplish this, Fuscone describes making the board "magnetically permeable" (4:25-26).

9. Fuscone explains:

> The board consists of two plates, 12a and 12b, which are bonded together. The target board 12a has recesses 8, 9, 10, 11 . . . ; into these recesses a ferrite semi-hard rubber or the like substance is placed. . . The reinforcement board 12b has holes

> allowing the prolonged cores 3 of the coils 4 to protrude and to touch the magnetic rubber fillings.

(4:27-38; Fig. 8.)

The Gordon patent

10. Gordon teaches a device for measuring the point of impact of a missile, such as a sports projectile, on a target (Abstract).

11. The device can comprise three planes within a target mat, where the first plane contains a series of strip magnets 18 arranged with the same magnetic polarity and "close enough to one another to create a substantially uniform magnetic field" (col. 3, l. 66 to col. 4, l. 5).

12. The mat further comprises second and third planes comprising conductors 22 and wires 16, respectively, which in turn are attached to terminals (col. 4, l. 9-20).

13. According to Gordon, the operating principle is:

> such that when the missile impacts the target and the force of impact deflects the foam mat, the wire[s] . . . deflect. The deflection of such wires in the field created by magnets 18, causes a small but discernible voltage to be created on the wires 22 and 16, and in turn on the terminals . . . . The amount of the signal depends on the speed of the wire moving through the field, the magnitude of the field, and the field gradient.

(Col. 4, ll. 21-29.)

14. Gordon teaches that the magnetic strips 18 may be replaced by "electro magnets with coils of wire" and the "coils may be air wound or, to achieve a higher field, wound around a ferromagnetic core" (col. 4, l. 60 to col. 5, l. 3).

Analysis

The issue in this appeal turns on the question of whether the Examiner provided sufficient evidence to establish that a coreless coil would have been reasonably expected to perform the same function as the iron cored coil in Fuscone's dartboard.

For the rejection over Fuscone, alone, the Examiner found

> the purpose of providing the iron core in the inductor is to concentrate the effect of any magnetic field within the center of the induction coil (within the iron cores). However, as is well known by one of ordinary skill in the art, an inductor in its simplest form is a conductive wire formed in the shape of a loop or coil, and will create the magnetic field inside the coil without the presence of the core. Therefore, the inclusion of iron cores in the inductors disclosed by Fuscone is not necessary, as the inductor would still perform the necessary function of creating a magnetic field within the center of the induction coil with or without the iron core, albeit the magnetic field would not have been as concentrated as had the iron core been in place.

(Ans. 4.)

Based on this finding, the Examiner reasoned that the ordinary skilled worker "would have been motivated to remove the core from the induction coil for any application that requires a small amount of inductance as in said dartboard to reduce the weight of the apparatus and lower manufacturing costs" (*id.* at 5). The Examiner also asserted that replacing an iron cored induction coil with a coreless coil was "a matter of design choice" (*id.*).

The Examiner's reasoning is not supported by the evidence. The only induction coil taught by Fuscone is one which contains an iron core 3 (FF3). Fuscone stated that the signal produced by the magnetic dart upon impact could be increased by adding to the dartboard plate magnetic rubber fillings

which are placed in contact with the iron core 3 (FF7-9). Thus, Fuscone teaches *increasing* signal strength by adding a magnetic rubber cap to the top of the induction coil's iron core.

The Examiner admitted that the coil without an iron core would experience a less "concentrate[d] effect" from the magnetic dart (Ans. 4), but provided no evidence that it would still be capable of detecting the impact of a magnetic dart in the context of Fuscone's sensor assembly. Fuscone explicitly teaches that its goal is to identify the location of the source of the largest signal in order to determine which sector is impacted by the dart (2:34-40). This is accomplished with a circuit and an inductance coil with an iron core (*id.*). Given that Fuscone describes boosting signal strength of the coil by adding a magnetic rubber cap, we are not persuaded that persons of ordinary skill in the art would have sought to *decrease* the signal strength by eliminating the iron core and that the reduced signal would have been reasonably expected to work. Although absolute predictability is unnecessary to establish obviousness, there still must be a reasonable expectation of success. *In re Longi*, 759 F.2d at 896.

In addition, the Examiner stated

> it would have been obvious to one of ordinary skill in the art at the time of the invention to remove the iron core of the inductance coils disclosed by Fuscone and simply increase the number of turns in the coreless coil to create a magnetic field of equivalent strength to that of an inductance coil containing an iron core.

(Ans. 12.)

This argument is also not persuasive. Even assuming that increasing the number of turns in a coreless coil would increase its magnetic strength, there is no evidence that the additional coils were a suitable alternative in

Fuscone's device, or that they would permit the coreless coil to achieve the same effect desired by Fuscone as an iron cored coil. In fact, since Gordon teaches that a higher field is achieved with a cored coil than with the coreless or "air wound" coil (FF14), the evidence points to the opposite conclusion.

In sum, the Examiner has not provided sufficient evidence that combination of Fuscone with a coreless coil would work for its intended purpose.

The rejection over Fuscone was buttressed by the Gordon patent in a new ground of rejection set forth in the Answer (Ans. 7). The Examiner found that it would have been obvious to include coreless inductance coils in Fuscone's dartboard, "instead of inductance coils containing iron cores" because Gordon teaches that coils with or without a ferromagnetic core could be utilized in its sports target system (*id.* at 8-9).

Gordon's system appears to operate on a different principle than does Fuscone's dartboard. According to Gordon, a missile impacts the target, causing a deflection in the magnetic field produced by the electromagnetic coils (FF13-14; Reply Br. 3). Fuscone, on the other hand, does not attribute its signal identification to magnetic field deflection, but rather describes it as a consequence of a voltage change in a sensor coil produced by a magnetic dart (FF5-7). Therefore, we are not persuaded that Gordon would have reasonably suggested to persons of ordinary skill in the art substituting a coreless inductance coil in Fuscone's dartboard.

OBVIOUSNESS OVER CLARK

Claim 7 stands rejected under 35 U.S.C. § 103(a) as obvious over Fuscone and Clark, or Fuscone, Gordon, and Clark (Ans. 6 & 10).

Claim 7 indirectly depends on claim 1 and recites that "a plurality of said coreless coils correspond to different scoring areas representing the same score, are wired together before being connected to said electronic scoring means." The Examiner cited Clark for its teaching of connecting inputs having the same signal into the same input line (Ans. 7). This teaching does not remedy the deficiency described above for Fuscone or Fuscone in combination with Gordon.

CONCLUSION OF LAW

Appellant established that the Examiner erred in concluding that it would have been obvious to persons of ordinary skill in the art to have eliminated the iron core from the inductance coil in Fuscone's dart board.

SUMMARY

The obviousness rejections of claims 1-11, 14, and 15 are reversed.

REVERSED

Ssc:

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